Course Overview

https://modulusglobal.com/learn/

Prerequisites

1. Programming experience in one of: C++, C#, Python, R, Rust, or MATLAB. Focus on data manipulation and analysis. If lacking programming proficiency, complete a Python course (e.g., Codecademy, FreeCodeCamp, Udemy) before enrolling.

2. Basic understanding of financial markets: Stocks, Commodities, Forex, Cryptocurrencies

3. Familiarity with trading/investing: Placing and canceling orders, Using self-directed trading platforms (e.g., Robinhood, Coinbase)

Recommended but not required:

4. Mathematics foundation: Stochastic calculus, Statistics, Probability theory

5. Basic knowledge of machine learning: Supervised learning algorithms, Unsupervised learning algorithms

Notice

Lesson content and required reading are subject to change. Any such updates will be communicated to enrolled students in a timely manner. The content, trade secrets, algorithms, source code, and other proprietary, confidential information provided in this course may not be disclosed to any third party without express written permission of Modulus. The Modulus License Agreement, which includes a Non-Disclosure Agreement, will be provided after enrolling and must be signed prior to starting the course. Please refer to the postsecondary education, SEC, and CFTC disclaimers at the end of this syllabus.

Lesson 1: Introduction to Quantitative Trading: Fundamentals, Technology, and the Rise of Generative AI

This lesson covers the basics of quantitative trading, the tech stack used by most firms, and the roles and responsibilities of a quant trader. We'll discuss how generative AI is currently being used to develop, optimize, and maintain some of the most modern trading systems in use by the largest hedge funds and proprietary trading firms in the world. By the end of this lesson, you will have a solid understanding of the fundamentals and be prepared for the advanced lessons to follow.

Length: One week

Recommended Text:

"Quantitative Trading: How to Build Your Own Algorithmic Trading Business" by Ernest P. Chan

"The Man Who Solved the Market: How Jim Simons Launched the Quant Revolution" by Gregory Zuckerman

"The Quants: How a New Breed of Math Whizzes Conquered Wall Street and Nearly Destroyed It" by Scott Patterson

---

Lesson 2: Tooling Up: Trading Platforms, Programming Libraries, LLMs, and LM Studio

This lesson provides an overview of essential trading technology used in the industry and a primer on Large Language Models (LLMs), Hugging Face, LM Studio, and LLM hosting providers. We'll explore software and frameworks that facilitate quantitative analysis, algorithmic trading, trade automation, and running LLMs locally and in the cloud, discussing the pros and cons of each. The lesson covers key programming libraries for data analysis, visualization, and machine learning in finance. You'll also learn about various trading platforms and their features, as well as specialized tools for data processing, backtesting, optimization, and risk management. This knowledge will equip you with practical insights into the technological ecosystem of quantitative trading.

Length: Two weeks

Recommended Text:

"The Future of Finance with ChatGPT and Power BI: Transform your trading, investing, and financial reporting with ChatGPT and Power BI" by James Bryant, Aloke Mukherjee

"Prompt Design Patterns: Mastering the Art and Science of Prompt Engineering" by Yi Zhou

"Machine Learning for Algorithmic Trading: Predictive models to extract signals from market and alternative data for systematic trading strategies with Python" by Stefan Jansen

---

Lesson 3: Exchanges, ECNs, Direct Market Access, Brokerage APIs, and Industry Protocols

This lesson provides a comprehensive overview of the trading infrastructure essential for quantitative trading operations. You'll explore exchanges, Electronic Communication Networks (ECNs), and the concept of Direct Market Access (DMA). You'll study key financial industry protocols like FIX and FAST protocols, understanding their role in facilitating communication between trading systems and exchanges. The lesson also addresses market data feeds, order entry & management APIs, latency considerations, and relevant regulatory aspects. Additionally, we discuss the unique aspects of cryptocurrency exchanges, related arbitrage opportunities, and pitfalls. By the end, you'll have practical insights into building and optimizing the technological infrastructure required for efficient quantitative trading, including how to navigate the complex landscape of exchanges, ECNs, and brokers, and leverage industry-standard protocols and APIs.

Length: Two weeks

Recommended Text:

"Trading and Exchanges: Market Microstructure for Practitioners" by Larry Harris

"Machine Learning for Algorithmic Trading" by Stefan Jansen

Lesson 4: Efficient Market Hypothesis and Market Participants: Factors that Drive Market Predictability

This lesson examines the Efficient Market Hypothesis (EMH) and its implications. You'll explore the different forms of market efficiency and how they impact the potential for generating alpha. The lesson then shifts focus to various market participants, including institutional investors, retail traders, and algorithmic systems, analyzing how their behaviors and interactions contribute to market dynamics. You'll learn about factors that can lead to market inefficiencies and predictability, such as behavioral biases, information asymmetry, and market microstructure. The lesson also covers how quants can identify and exploit these inefficiencies through advanced analytical techniques. By understanding these concepts, you'll gain insights into developing more effective trading strategies that capitalize on market inefficiencies while accounting for the challenges posed by the EMH.

Length: Two weeks

Recommended Text:

"A Non-Random Walk Down Wall Street" by Andrew W. Lo and A. Craig MacKinlay

---

Lesson 5: Building a Basic Trading System with Moving Average Crossover using Generative AI

This hands-on lesson guides you through building a complete, simple trading system from the ground up. You'll develop a strategy based on moving average crossovers, implement self-optimization using sliding windows, and incorporate basic risk management. The lesson covers coding the core strategy in C# and Python, backtesting, parameter optimization, and risk management implementation. You'll learn to integrate the system with a broker API for live trading. By the end, you'll have a functional trading system demonstrating key components of algorithmic trading, providing a foundation for more complex strategies. This practical experience will solidify your understanding of strategy development, testing, and live trading best practices.

Length: Two weeks

Recommended Text:

"Cybernetic Trading Strategies: Developing a Profitable Trading System with State-of-the-Art Technologies" by Murray A. Ruggiero

"Advances in Financial Machine Learning" by Marcos Lopez de Prado

---

Lesson 6: Generative AI for Trading Strategy Development

This lesson explores the application of generative AI to discover new trading strategies. You'll learn how to use large language models and other generative AI techniques to analyze market data, generate novel trading ideas, and optimize existing strategies. The lesson covers prompt engineering for finance, fine-tuning AI models, and interpreting AI-generated insights. You'll gain hands-on experience in using generative AI to discover new alpha factors and enhance traditional quantitative models. The lesson also addresses the challenges and limitations of AI-generated strategies, teaching you how to validate and refine AI outputs for real-world trading applications.

Length: Two weeks

Recommended Text:

"The Future of Finance with ChatGPT and Power BI" by James Bryant, Aloke Mukherjee

"Generative Deep Learning: Teaching Machines to Paint, Write, Compose, and Play" by David Foster

"Fast Adversarial Attacks on Language Models in One GPU Minute" (paper) by Vinu Sankar Sadasivan, et al.

Lesson 7: AI-Powered Adaptive Trading System Development, Back Testing, and Risk-Adjusted Performance Measures

In this lesson, we delve into building adaptive trading systems using generative AI. You'll learn how to create trading algorithms that can automatically adjust to changing market conditions. The course covers reinforcement learning techniques, generative adversarial networks for market simulation, and dynamic strategy optimization. You'll explore how to use AI to continuously evolve trading rules, manage risk in real-time, and respond to market regime changes. The lesson also addresses the integration of AI-powered systems with traditional trading infrastructure, ensuring robustness and reliability in live trading environments. We'll also discuss trading system back testing, how to avoid curve fitting to data while back testing, and while training Neural Network models, out-of-sample or walk-forward testing using Generative AI, Monte Carlo Simulation, Maximum Drawdown, Value Added Monthly Index (VAMI), Compound Monthly Rate of Return, Standard and Downside Deviation, Sharpe Ratio, Sortino Ratio, Calmar Ratio, Sterling Ratio, Modulus PTR, and more. You'll learn how to optimize your strategies using multiple risk-adjusted performance measures to find global maximum profit while avoiding curve fitting.

Length: Three weeks

Recommended Text:

"Advances in Financial Machine Learning" by Marcos Lopez de Prado

"Machine Learning in Finance: From Theory to Practice" by Matthew F. Dixon, Igor Halperin, Paul Bilokon

---

Lesson 8: Statistics and Probability Theory for Trading

We discuss essential statistics and probability theory concepts crucial for trading. We'll explore the Central Limit Theorem and its implications for risk management, Extreme Value

Theory for modeling tail risks, and Generalized Pareto distributions for analyzing extreme events. The lesson will cover Monte Carlo Simulations for scenario analysis, discuss the impact of Black Swan Events on markets, and examine stochastic processes including the Poisson Process, Wiener Process, and Brownian Motion. We'll also investigate how these concepts interrelate and their practical applications in quantitative trading strategies, portfolio optimization, and risk assessment. Additionally, we'll touch on related topics such as fat-tailed distributions, volatility clustering, and the challenges of applying these theories in real-world market conditions.

Length: Four weeks

Recommended Text:

"Machine Learning for Algorithmic Trading" by Stefan Jansen

Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python" by Peter Bruce, Andrew Bruce, Peter Gedeck

"Introduction to Statistics: An Intuitive Guide for Analyzing Data and Unlocking Discoveries" by Jim Frost

"Hypothesis Testing: An Intuitive Guide for Making Data Driven Decisions" by Jim Frost

"Bayesian Statistics the Fun Way: Understanding Statistics and Probability with Star Wars, LEGO, and Rubber Ducks" by Will Kurt

"Bayesian Statistics for Beginners: a step-by-step approach" by Therese M. Donovan, Ruth M. Mickey

"Everything Is Predictable: How Bayesian Statistics Explain Our World" by Tom Chivers

"Bayesian Analysis with Python - Third Edition: A practical guide to probabilistic modeling" by Osvaldo Martin

"Bayesian Data Analysis" by Andrew Gelman, et al.

"A Concise Introduction to Bayes' Theorem" by Kelly J. Kirkland

"Probability Theory: The Logic of Science" by E. T. Jaynes, G. Larry Bretthorst

"An Introduction to Probability Theory and Its Applications Vol 2" by William Feller

"Quantum Mechanics and Bayesian Machines" by George Chapline

Lesson 9: Quant Data Sources, Big Data, Preprocessing, Visualization, and Principle Component Analysis

This lesson covers essential aspects of data in quantitative trading. It explores various quant data sources, including financial market data and alternative, non-traditional, data sets. You'll learn Generative AI-assisted data preprocessing techniques for preparing raw data including anomaly detection, outlier removal, interpolation, scaling, and data visualization methods to understand patterns and trends in complex financial datasets. The lesson also introduces Principle Component Analysis (PCA) for dimensionality reduction, feature extraction, and input selection for trading strategies. Throughout, you'll apply these concepts to real-world financial datasets, gaining practical experience in handling and analyzing data for quantitative trading.

Length: Two weeks

Recommended Text:

"The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition" by Trevor Hastie, Robert Tibshirani, Jerome Friedman

"Fundamentals of Data Analytics" by Russell Dawson

"Advances in Financial Machine Learning" by Marcos Lopez de Prado

"Machine Learning for Algorithmic Trading" by Stefan Jansen

Lesson 10: Developing Time Series Analysis and Anomaly Detection for Quantitative Trading

This lesson covers a wide range of complex topics based on sophisticated time series analysis and anomaly detection techniques essential for quantitative trading. You'll explore both classical and modern approaches to analyzing financial time series data. The lesson delves deeper into quantitative finance, discussing advanced topics such as Value at Risk (VaR) calculations, ARIMA models, GARCH, EGARCH, and GJR-GARCH models for volatility forecasting, state-space models including Kalman filters, and Neural Networks. You'll learn about cointegration analysis for pairs trading and other relative-value strategies. We'll discuss heteroscedasticity vs homoscedasticity and other advanced topics. The lesson delves into non-linear time series models and regime-switching models to capture complex market dynamics. You'll gain practical experience in applying wavelet analysis and Fast Fourier transforms for detecting cyclical patterns in financial data. The course includes techniques for handling high-frequency data and dealing with issues like irregular

sampling and microstructure noise. By the end of this lesson, you'll be equipped to apply advanced time series analysis methods to develop more accurate forecasting models and robust trading strategies across various market conditions and timeframes.

Length: Four weeks

Recommended Text:

"A Non-Random Walk Down Wall Street" by Andrew W. Lo and A. Craig MacKinlay

"Machine Learning for Algorithmic Trading" by Stefan Jansen

Lesson 11: Market Microstructure and Algorithmic Execution Strategies

We explore the intricate dynamics of market microstructure and its application in developing effective algorithmic execution strategies. You'll gain a deep understanding of order book mechanics, liquidity dynamics, and market impact analysis. The lesson covers various types of orders, market maker behavior, and the nuances of different exchange structures. You'll learn to design and implement sophisticated execution algorithms that minimize market impact and transaction costs while optimizing fill rates. The lesson also addresses topics such as smart order routing, adaptive execution techniques, and strategies for handling large orders in illiquid markets. By integrating market microstructure knowledge with algorithmic execution, you'll be equipped to develop more efficient and cost-effective trading systems that can navigate complex market environments.

Length: Two weeks

Recommended Text:

"Trading at the Speed of Light: How Ultrafast Algorithms Are Transforming Financial Markets" by Donald MacKenzie

"Trading and Exchanges: Market Microstructure for Practitioners" by Larry Harris

---

Lesson 12: Advanced Risk Management and Portfolio Management Methodologies

Here we delve deep into advanced risk management and portfolio management methodologies crucial for quantitative trading. You'll explore sophisticated techniques for measuring and mitigating various types of financial risks, including market, credit, and liquidity risks. The lesson covers modern portfolio theory, Kelly Criterion, factor models, and advanced optimization techniques for portfolio construction and management. You'll

learn about dynamic risk allocation, stress testing, and scenario analysis to enhance portfolio resilience. The lesson also introduces advanced concepts like tail risk hedging and the use of derivatives for risk management. Throughout, you'll apply these methodologies to real-world trading scenarios, gaining practical insights into maintaining robust and balanced portfolios in volatile market conditions.

Length: Three weeks

Recommended Text:

"Kelly Capital Growth Investment Criterion" by Leonard C. MacLean, Edward O. Thorp, William T. Ziemba

"Modern Portfolio Theory and Investment Analysis" by Edwin J. Elton, Martin J. Gruber, Stephen J. Brown, William N. Goetzmann

"Machine Learning for Asset Managers" by Marcos M. López de Prado

"The Mathematics of Money Management" by Ralph Vince

"Portfolio Management Formulas: Mathematical Trading Methods for the Futures, Options, and Stock Markets" by Ralph Vince

"Advanced Portfolio Management: A Quant's Guide for Fundamental Investors" by Giuseppe A. Paleologo

"Quantitative Equity Portfolio Management, Second Edition: An Active Approach to Portfolio Construction and Management" by Ludwig B. Chincarini, Daehwan Kim

---

Lesson 13: Statistical Arbitrage Strategies for Quantitative Trading

We discuss generative AI-assisted statistical arbitrage, a powerful approach in quantitative trading for identifying and exploiting temporary mispricings in financial markets. You'll learn to develop models that detect statistical relationships between related securities and design strategies to capitalize on deviations from these relationships. This lesson covers pair trading, cointegration analysis, and multi-factor statistical models. You'll explore techniques for risk management, trade execution, and portfolio construction specific to statistical arbitrage. The lesson also addresses the challenges of capacity constraints and strategy decay. By the end, you'll be equipped to implement and manage sophisticated statistical arbitrage strategies across various asset classes.

Length: Two weeks

Recommended Text:

"Algorithmic Trading Methods: Applications Using Advanced Statistics, Optimization, and Machine Learning Techniques" by Robert Kissell

"Machine Learning for Algorithmic Trading" by Stefan Jansen

Lesson 14: Machine Learning for Trading with Large Language Models, Neural Networks, and Genetic Algorithms

This lesson delves into advanced machine learning techniques and their applications in quantitative trading. You will explore how fine-tuned, ultra-fast LLMs can be developed to create sentiment analysis and news-based trading strategies that provide an unfair advantage, challenging the Efficient Market Hypothesis. This lesson then covers Neural Networks, focusing on implementing deep learning models for price prediction and pattern recognition in financial time series data, leveraging trade secrets and proprietary techniques utilized by Modulus since the 1990s. Finally, this lesson introduces Genetic Algorithms as a means to optimize trading strategies and portfolio allocation.

Length: Two weeks

Recommended Text:

"Algorithmic Trading Methods: Applications Using Advanced Statistics, Optimization, and Machine Learning Techniques" by Robert Kissell

"Advances in Financial Machine Learning" by Marcos Lopez de Prado

"Machine Learning in Finance: From Theory to Practice" by Matthew F. Dixon, Igor Halperin, Paul Bilokon

"Machine Learning for Asset Managers (Elements in Quantitative Finance)" by Marcos M. López de Prado

---

Lesson 15: Using Large Language Models for Sentiment Analysis of Social Media and Analyst Opinions

We discuss the application of Large Language Models (LLMs) in quantitative trading, focusing on sentiment analysis of social media and analyst opinions. You'll learn how to leverage advanced natural language processing techniques to extract valuable insights from unstructured text data. This lesson covers methods for fine-tuning LLMs on financial text, implementing sentiment scoring systems, and integrating these insights into trading

strategies. Practical examples will demonstrate how to use sentiment analysis to potentially predict market movements and enhance trading decisions.

Length: Two weeks

Recommended Text:

"Thinking, Fast and Slow" by Daniel Kahneman

"The Future of Finance with ChatGPT and Power BI" by James Bryant, Aloke Mukherjee

"Advances in Financial Machine Learning" by Marcos Lopez de Prado

---

Lesson 16: High-Performance Computing for Quantitative Trading

We'll explore the application of high-performance computing (HPC) techniques for use with running customer LLMs and for quantitative trading. You'll learn about parallel processing, GPU acceleration, LPUs such as Groq™, and distributed computing systems to enhance the speed and efficiency of AI learning, inference, and trading algorithms. This lesson covers hardware configurations and optimization techniques for computationally intensive tasks such as backtesting, Monte Carlo simulations, and real-time data processing. We'll discuss why and when custom FPGA or ASIC devices may be beneficial. You'll explore cloud-based HPC solutions and their integration with trading infrastructure. The lesson also addresses the challenges of low-latency trading and strategies to minimize execution times. By the end, you'll understand how to leverage HPC to gain a competitive edge in quantitative trading, enabling faster analysis, more complex models, and improved strategy execution.

Length: Two weeks

Recommended Text:

"The Future of Finance with ChatGPT and Power BI" by James Bryant, Aloke Mukherjee

"Gradient Descent, Stochastic Optimization, and Other Tales" by Jun Lu

---

Lesson 17: Advanced Options and Derivatives Trading Strategies

We focus on advanced quantitative approaches to options and derivatives trading. You'll explore sophisticated models for options pricing, including extensions and alternatives to the Black-Scholes model, put-call parity, the Greeks (Delta, Gamma, Theta, Vega, and

Rho), Jensne's Inequality, and Marking to Market. The lesson covers volatility trading strategies, encompassing both implied and realized volatility. You'll learn to develop and implement delta-neutral strategies, volatility arbitrage, and complex option spreads. The lesson also delves into quantitative methods for risk management and hedging, including dynamic hedging techniques and the use of Greeks. You'll gain insights into the intricacies of exotic options and structured products. By the end of this lesson, you'll be equipped to design, implement, and manage advanced options and derivatives strategies using quantitative techniques, enhancing your ability to navigate and profit from these complex financial instruments.

Length: Four weeks

Recommended Text:

"All About Derivatives" by Michael Durbin

"Derivatives Essentials: An Introduction to Forwards, Futures, Options and Swaps" by Aron Gottesman

"The Mathematics of Financial Derivatives: A Student Introduction" by Paul Wilmott, Sam Howison, Jeff Dewynne

"Options Trading Simplified for Beginners: Master the Essential Options Skills for Generational Wealth Even With A Small Account" by Woodley Funtanilla

---

Lesson 18: Developing a Renaissance-Inspired Markov and Mean Reversion Trading System

We focus on developing a sophisticated trading system inspired by the renowned quantitative hedge fund Renaissance Technologies. You'll explore the principles of Markov models and mean reversion strategies, two key concepts often associated with Renaissance's approach, in addition to intermarket analysis. The lesson covers the mathematical foundations of Markov chains and their application to financial time series. You'll learn how to identify and exploit mean reversion patterns in various asset classes. The lesson also delves into advanced statistical techniques for signal generation, position sizing, and risk management within this framework. You'll implement these concepts in a practical trading system, incorporating machine learning methods for parameter optimization and adaptability. Throughout the lesson, you'll gain insights into how to combine multiple quantitative approaches to create a robust, Renaissance-inspired trading strategy.

Length: Two weeks

Recommended Text:

"The Man Who Solved the Market: How Jim Simons Launched the Quant Revolution" by Gregory Zuckerman

"A Man for All Markets: From Las Vegas to Wall Street, How I Beat the Dealer and the Market" Edward O. Thorp

"Machine Learning for Algorithmic Trading" by Stefan Jansen

Lesson 19: High-Frequency Trading Strategies and Technologies

This lesson delves into the world of high-frequency trading (HFT), exploring the cutting-edge strategies and technologies used in ultra-fast trading environments. You'll learn about the infrastructure required for HFT, including low-latency networks, specialized hardware, and co-location services. The lesson covers specific HFT strategies such as market making, statistical arbitrage, and latency arbitrage, with a focus on their implementation in microsecond-level timeframes. You'll explore advanced order types and exchange-specific features that HFT firms leverage. The lesson also addresses risk management techniques crucial for HFT, including real-time risk controls and circuit breakers. You'll gain insights into the regulatory landscape surrounding HFT and its impact on market structure. By the end, you'll understand the technological and strategic requirements for operating in high-frequency trading environments, as well as the challenges and controversies surrounding this trading approach.

Length: Two weeks

Recommended Text:

"Trading at the Speed of Light: How Ultrafast Algorithms Are Transforming Financial Markets" by Donald MacKenzie

---

Lesson 20: Developing a Politician Trade Tracking System with LLM Sentiment Analysis

We'll explore the development of an advanced politician tracking system leveraging data supplied by SEC filings with Large Language Models (LLMs) for sentiment analysis. You'll learn how to create a system that monitors and analyzes politicians' reported trades, public statements, speeches, and social media posts to develop a system that exceeds the alpha

capabilities of retail trading signals. This lesson covers techniques for fine-tuning LLMs on political discourse, implementing real-time sentiment analysis, and detecting policy shifts or significant announcements. You'll explore how this information can be leveraged in trading strategies, particularly for sectors or assets affected or influenced by political decisions. The lesson also addresses ethical considerations and potential biases in such systems.

Length: Two weeks

Recommended Text:

"Throw Them All Out" by Peter Schweizer

"The Future of Finance with ChatGPT and Power BI" by James Bryant, Aloke Mukherjee

---

Lesson 21: Quantitative Trading in Cryptocurrencies and Decentralized Finance (DeFi)

This lesson delves into the unique aspects of applying quantitative trading strategies to cryptocurrencies and DeFi markets. You'll explore the characteristics of crypto markets, including their 24/7 nature, high volatility, diverse exchange ecosystems, and arbitrage opportunities. This lesson covers data sources specific to crypto, including on-chain data and decentralized exchange (DEX) liquidity pools. You'll learn how to adapt traditional quant strategies for crypto markets and develop new approaches tailored to this asset class. The lesson also introduces DeFi concepts relevant to quant trading, such as automated market makers (AMMs) and yield farming. You'll gain insights into risk management considerations specific to crypto, including smart contract risk and regulatory uncertainty.

Length: Two weeks

Recommended Text:

"Cryptocurrency Quick Start Guide: The Simplified Beginner's Guide to Digital Currencies, Bitcoin, and the Future of Decentralized Finance" by Jonathan Reichental PhD

Lesson 22: Regulatory Compliance in Financial Markets and Quantitative Trading

This lesson focuses on the regulatory landscape surrounding quantitative trading. You'll explore key regulations and compliance requirements in major financial markets, including those set by the SEC, FINRA, and other international regulatory bodies. This lesson covers topics such as market manipulation laws, reporting requirements, and best execution

practices. You'll learn about the implications of algorithmic trading regulations and how they affect quant strategies. The lesson also addresses risk management and internal control requirements, as well as the importance of maintaining audit trails. By the end of this lesson, you'll understand how to develop and implement quant trading strategies within the bounds of current regulations.

Length: One week

Recommended Text:

"Fund Director's Guidebook" by Federal Regulation of Securities Committee

---

Lesson 23: Quantum Computing Applications in Quantitative Finance

This forward-looking lesson explores the emerging field of quantum computing and its potential applications in quantitative finance. You'll gain an understanding of quantum computing fundamentals and how they differ from classical computing paradigms. The lesson covers potential applications of quantum algorithms in areas such as portfolio optimization, risk management, and derivative pricing. You'll explore quantum machine learning techniques and their possible advantages in financial modeling and prediction. The lesson also addresses current limitations of quantum technology and the timeline for practical implementations in finance. You'll learn about hybrid classical-quantum approaches that may bridge the gap to fully quantum systems. By the end of this lesson, you'll have insights into how quantum computing could revolutionize quantitative finance and be prepared to leverage these advancements as they become available in the coming years.

Length: One week

Recommended Text:

"Quantum Physics for Beginners: From Wave Theory to Quantum Computing" by Carl J. Pratt

"Programming Quantum Computers: Essential Algorithms and Code Samples" by Eric R. Johnston, Nic Harrigan, Mercedes Gimeno-Segovia

"Quantum Mechanics and Bayesian Machines" by George Chapline

Lesson 24: Quant Trading Firms, Roles, and Self-Directed Trading

This final lesson in the Quant Trading Course provides a comprehensive overview of the type of firms that utilize quants, including hedge funds, proprietary trading firms, investment banks, and asset management companies. This lesson covers different roles within the quant trading ecosystem, such as quantitative researcher, trader, risk manager, and portfolio manager, detailing the responsibilities, skills, risks, and often, NDAs and non-competes required for each. This lesson also addresses self-directed trading, discussing the challenges and potential rewards of managing your own trading strategies to manage your own funds.

Length: One week

Recommended Text:

"Cracking the Finance Quant Interview: 51 Interview Questions and Solutions" by Jean Peyre, Editions Ducourt

"150 Most Frequently Asked Questions on Quant Interviews, Second Edition" by Dan Stefanica, Radoš Radoičić, Tai-Ho Wang

"Ace the Data Science Interview" by Nick Singh, Kevin Huo

"Machine Learning System Design Interview" by Ali Aminian, Alex Xu

"My Life as a Quant: Reflections on Physics and Finance" by Emanuel Derman

---

Additional Recommended Reading

General Quantitative Finance (applicable to multiple lessons):

"An Introduction to Quantitative Finance" by Stephen Blyth

"A First Course in Quantitative Finance" by Thomas Mazzoni

"Frequently Asked Questions in Quantitative Finance" by Paul Wilmott

"Stochastic Calculus for Finance I: The Binomial Asset Pricing Model" by Steven Shreve

"A Primer for The Mathematics of Financial Engineering, Second Edition" by Dan Stefanica

Mathematics and Learning Resources (applicable to multiple lessons):

"Calculus Made Easy" by Silvanus P. Thompson, Martin Gardner

"Mathematical Notation: A Guide for Engineers and Scientists" by Edward R. Scheinerman

"Financial Calculus: An Introduction to Derivative Pricing" by Martin Baxter, Andrew Rennie

"No bullshit guide to math and physics" by Ivan Savov

"How to Prove It: A Structured Approach" by Daniel J. Velleman

"The Calculus Lifesaver: All the Tools You Need to Excel at Calculus" by Adrian Banner

"Super Learning: Advanced Strategies for Quicker Comprehension, Greater Retention, and Systematic Expertise" by Peter Hollins

Required Disclaimers

Postsecondary Education Disclaimer: The Modulus AI Quant Trading Course is a content subscription of proprietary technology, source code, documentation, and programming lessons documented in the form of written material and video content, designed as self-paced, pre-recorded tutorials for personal enrichment and skill development. This material is akin to instructional books, audio books, or self-help videos, and does not include live instruction or interaction with teachers. This course is exempt from accreditation or licensing by any state or federal education department. While the program includes exams and offers Modulus-specific certifications, these are not equivalent to academic degrees or government-recognized professional certifications. Use of the source code and documentation does not lead to any formal degree, credential, or college credit recognized by government agencies, nor does it guarantee employment or job placement, as outcomes vary based on individual efforts and market conditions. Please review our refund policy and terms of service for details on cancellations and refunds. Our programs are governed by consumer protection laws applicable in our operational jurisdictions. Modulus does not follow, and is exempt from, traditional academic structures or regulatory requirements for educational institutions.

CFTC and SEC Disclaimers: Hypothetical performance results have many inherent limitations, some of which are described below. No representation is being made that any account will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently achieved by any particular trading program. One of the limitations of hypothetical performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical trading does not involve financial risk, and no hypothetical trading record can completely account for the impact of financial risk in actual trading, for example, the ability to withstand losses or to adhere to a particular trading program in spite of trading losses are material points which can also adversely affect actual trading results. There are numerous other factors related to the markets in general or to the implementation of any specific trading program which cannot be fully accounted for in the preparation of hypothetical performance results and all of which can adversely affect actual trading results. Modulus does not promote stocks in the software or on the web site. Modulus does not receive any compensation from companies whose stocks appear in the software or on the web site and Modulus has no financial interest in the outcome of any stock trades mentioned therein.